ORACLE

Oracle TimesTen In-Memory Database

What's New and Changed in the TimesTen 22.1 Release

Name

TimesTen PM Team
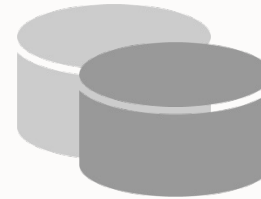
June 2024

What is TimesTen

Relational Database

- Pure in-memory
- ACID compliant
- Standard SQL
- Entire database in RAM
- Relational IMDB and Cache
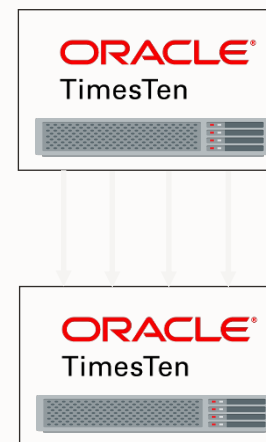 - Read-only and read-write cache for Oracle Database

Persistent and Recoverable

- Database and Transaction logs persisted on local storage
- Automatic recovery after failure

Extremely Fast

- Microseconds response time
- Very high throughput

Highly Available

- Active-Standby and multi-master replication
- High performance parallel replication
- HA and Disaster Recovery

[Date]

TimesTen Kubernetes Operator
Containerized Cloud-Agnostic Environments

- TimesTen is supported in containers orchestrated using Kubernetes
- TimesTen provides a feature rich Kubernetes Operator
  - ✓ Quick, easy deployment
  - ✓ Automated Upgrade
  - ✓ Monitoring, Management, Metrics, and HA management
  - ✓ Any Kubernetes Environment
  - ✓ Any public cloud
  - ✓ On-premises
  - ✓ Production proven
  - ✓ Fully supported part of TimesTen
- Can operate as a database of records or as a cache

                    [Date]
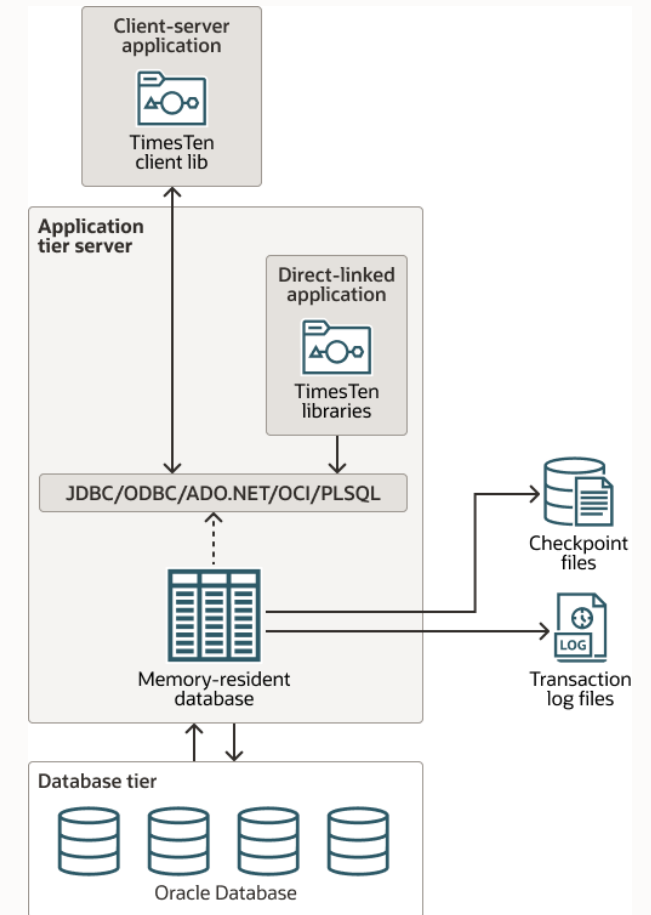
Oracle TimesTen In-Memory Database for Kubernetes

- An offering that enables the deployment of TimesTen databases on Oracle Cloud Infrastructure (OCI)
  - You access the Oracle TimesTen In-Memory Database for Kubernetes using Oracle Cloud Infrastructure Marketplace applications.
- In addition to the cost of the compute resources used for your Kubernetes cluster, Oracle TimesTen In-Memory Database for Kubernetes supports the following billing option:
  - Bring Your Own License (BYOL), which allows you to reuse your existing on-premises TimesTen In-Memory Database and TimesTen Application Tier Database Cache licenses.

                    [Date]
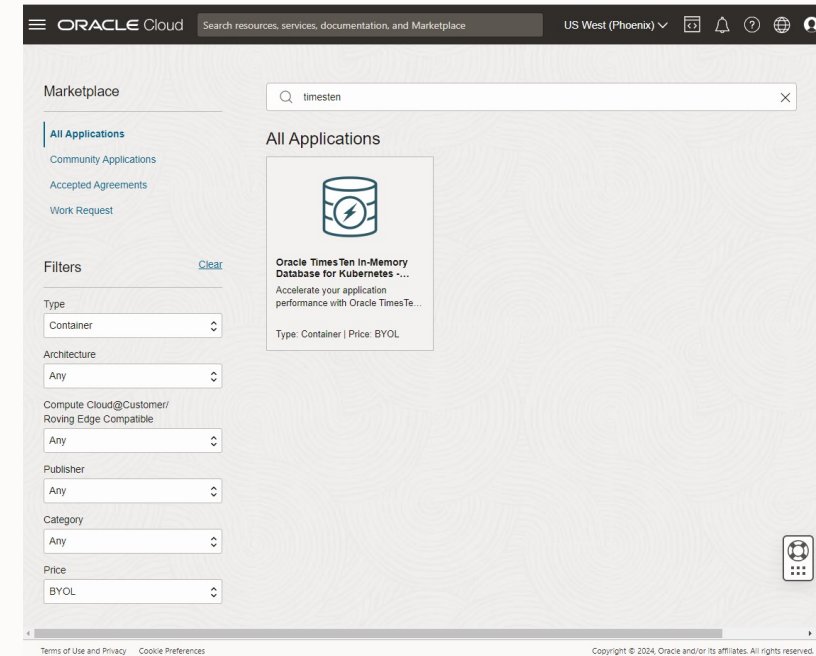
Oracle TimesTen – Class Leading In-Memory Database
+25 Years of Extreme Performance

1996 – 2005	2006 – 2008	2009 – 2011	2012 – 2013	2014 – 2017	2018 – 2021	2021
Pre-Oracle acquisition	**TimesTen 6 TimesTen 7**	**TimesTen 11g 11.2.1**	**TimesTen 11g 11.2.2**	**TimesTen 11.2.2.x Enhancements**	**TimesTen 18.1 with Scaleout**	**TimesTen 22.1**
• First commercial In-Memory RDBMS • Replication for HA • Online Upgrades • Application-tier Cache for Oracle Database	• Oracle RAC integration • National Language Support • Oracle Data Types support • SQL Developer Integration • Enterprise Manager integration	• Parallel log manager • PL/SQL and OCI Support • Oracle Clusterware integration for replication management • ODP .NET Support • BLOB, CLOB, NCLOB data types	• Parallel Replication • In-Memory Analytics • Columnar Compression • Index Advisor • Oracle R Support • In-Memory Star Join	• Parallel data import from Oracle Database • Parallel database restart • Highly concurrent range indexes • Parallel Replication with commit order optimization	• Distributed Fault-Tolerant In-Memory Database • All active data copies • Transparent distributed SQL execution • ACID Transactions • Global Secondary Indexes	• Scaleout improvements • Easier, faster upgrades • Kubernetes Operator • Prometheus Integration • GoldenGate Integration • **TimesTen XE** • OCI Marketplace • ARM support

Platform support
Server platforms

Operating System	OS Versions	Java versions
Oracle Linux 64-bit	7.4+, 8.2+, 9.2+	Oracle Java 8, 11, 17, 21 and OpenJDK 8, 11, 17, 21
Oracle Linux ARM 64-bit	8.5	Oracle Java 8, 11, 17, 21 and OpenJDK 8, 11, 17, 21
RedHat Enterprise Linux 64-bit	7.4+, 8.2+, 9.2+	Oracle Java 8, 11, 17, 21 and OpenJDK 8, 11, 17, 21
SUSE Enterprise Server 64-bit	12, 15	Oracle Java 8, 11, 17, 21 and OpenJDK 8, 11, 17, 21
Ubuntu	22.04	Oracle Java 8, 11, 17, 21 and OpenJDK 8, 11, 17, 21
Solaris Intel and SPARC 64-bit	11.3, 11.4	Oracle Java 8 (both), 11 (SPARC only)
IBM AIX for Power PC 64-bit	7.1, 7.2, 7.3	IBM Java 8, 11

Platform support
Client platforms

Operating System	OS Versions	Java versions
Microsoft Windows 64-bit	10, 11, Server 2012 R2, Server 2016, Server 2019 Server 2022	Oracle Java 8, 11, 17, 21 and OpenJDK 8, 11, 17, 21
macOS Intel 64-bit	12.6 Monterey	Oracle Java 8, 11, 17, 21 and OpenJDK 8, 11, 17, 21

Platform support
Oracle Database, Kubernetes and Clusterware

- TimesTen Cache features support Oracle Database 11.2, 12.1, 19c and 21c.

- Kubernetes 1.25, 1.26, 1.27, 1.28 and 1.29

- TimesTen Active-Standby Pair Replication supports Oracle Clusterware 19c for A/S pair management

New Core Features

For all deployment modes

Prometheus exporter for TimesTen
- Facilitates monitoring of TimesTen using Prometheus

Support for password complexity checking functions in profiles

Configurable network buffer size for Client-Server
- Can significantly improve throughput with large result sets and/or slow networks

Additional options when creating certificates with the ttCreateCerts utility

TimesTen now supports FIPS 140-2 encryption

New ttPageLevelTableInfo builtin to display details of table page allocations

PL/SQL support for multiple OUT reference cursors

TimesTen Driver Manager (TTDM) productized and supported

Minor changes to TTClasses API for ODBC 3 64-bit support

Change to naming of directory for bundled Oracle instant client
- Instant client directory name is now release independent

New Classic features

For Classic and Classic Cache deployment modes

New ramPolicy (enduring) for 'persistent' shared memory

- Database segment persists across instance stop/start

Fast software upgrades for patch releases and patch sets

- Utilizes ramPolicy 'enduring'
- Avoids the need to unload/load the database from/to memory during a patch and patch set release upgrade

SNMPv3 support

- SNMP support updated to v3
  - Can still generate v1 traps, but use is discouraged (v1 is insecure)
- Uses net-snmp package
  - Customer must install this separately; not packaged with TimesTen
- Supports use of D-TLS to encrypt communications
  - Requires use of net-snmp 5.6 or later with tsm security model enabled

Explicit support for running the instance daemon under systemd

Copyright © 2024, Oracle and/or its affiliates

New Classic Cache features
For Classic Cache deployment mode

Dynamic loading of multiple cache instances
- Increases the range of SQL statements that qualify for dynamic load
- Limited to single table cache groups in this release

LRU aging based on table row thresholds
- A more granular alternative to the existing memory threshold based mechanism
- More suitable for some use cases

Hybrid (rootless) cache groups

New Scaleout features

For Scaleout and Scaleout Cache deployment modes

Maximum K-safety copies increased to 5
- Allows for increased levels of availability

Automated Software Upgrade
- support for online software upgrade for patch and patchset
- Offline upgrade also improved and simplified

Security enhancements
- Centralized management of client-server TLS certificates

Static READONLY Cache Groups
- Support for static READONLY autorefresh cache groups in Scaleout

Global Indexes
- Increased flexibility and performance

Kubernetes Operator support a TimesTenScaleout object type

Stored PL/SQL procedures and functions
- Support for the creation of stored procedures and functions

New TimesTen Kubernetes Operator features
For all deployment modes

Simplified installation process.

- Only one container image is required both to run the Operator and to run TimesTen itself.

- Ability to work with Oracle-supplied container images.

- Ability to change the user and group used to run TimesTen

- Ability to specify CPU and memory requests and limits.

- The Operator can automatically upgrade from one patch release of TimesTen to another.

Helm charts supporting the provisioning and upgrade of the TimesTen Operator and TimesTen Classic by using Helm.

The TimesTen Kubernetes Operator now publishes metrics to Prometheus.

- If the Prometheus Operator is deployed in your cluster, the TimesTen Kubernetes Operator can automatically add TimesTen databases and the TimesTen Operator to your Prometheus configuration

GoldenGate compatibility

An alternative cache refresh mechanism for READONLY caching

Certified with GoldenGate 21c

GoldenGate parallel replicat is supported (with GoldenGate 21.3 and later) for higher throughput

Newly deprecated features
Deprecated in this release, will be removed in a future release

Scaleout PhysicalGroups

Temporary databases (Temporary=1)

Static autorefresh cache groups with legacy replication

The TTC_RollbackRequiredOnFailover client connection attribute
- The default for this is now always 1 (on)

Local shared memory ipc (shmipc) for client-server connections

Removed features

Were deprecated in a previous release

The ttSQLCmdCacheInfo2 and ttSQLCmdCacheInfo3 builtins
* Users and applications should query the SYS.V$SQL_CMD_CACHE system view instead, using an explicit select list

Asynchronous Materialized Views

ReceiverThreads DSN attribute

Some ttMigrate options
* -convertTypesToTT
* -convertTypesToOra

Significant behavior changes
May impact users or applications

Two extra columns in the ttSQLCmdCacheInfo result set

- Users and applications should query the SYS.V$SQL_CMD_CACHE system view instead, using an explicit select list

The TTC_RollbackRequiredOnFailover client connection attribute

- The default for this is now always 1 (on)

TTClasses API changes

- Type changes for some method arguments.

ttRepAdmin –duplicate

- The –setMasterRepStart option is now the default
- Use -noSetMasterRepStart in the unlikely event that you want the original behavior

Licensing

High Performance In-Memory Database with High Availability

TimesTen Licensing

TimesTen is licensed in two distinct ways

- TimesTen In-Memory Database
  - ✓ Separate product
  - ✓ Includes all deployment modes and functionality
  - ✓ Any use case

- TimesTen Application Tier Database Cache
  - ✓ Oracle Database Enterprise Edition **option** (needs an associated DB EE license)
  - ✓ Includes all deployment modes and functionality
  - ✓ Deployment must be a caching use case (native or GoldenGate)
  - ✓ You license the CPUs where TimesTen is deployed, **not** the Oracle Database CPUs

Want to learn more?

TimesTen Product Portal (https://www.oracle.com/database/technologies/related/timesten.html)
- ✓ Product Information
  - ✓ Presentations, customers, use cases, technical briefs, FAQs, …
- ✓ Software Downloads
- ✓ Product Documentation
- ✓ TimesTen Demo / Learning VM download

TimesTen QuickStart and Samples (https://github.com/oracle/oracle-timesten-samples)

TimesTen Blog (https://blogs.oracle.com/timesten)

Our mission is to help people see data in new ways, discover insights, unlock endless possibilities.